

## Sources of Greenhouse Gases in the United States

Carbon dioxide (CO<sub>2</sub>) emissions are responsible for 84% of global warming pollution in the United States, and the majority of this CO<sub>2</sub> is generated by the burning of fossil fuels.<sup>1</sup> One-third of U.S. CO<sub>2</sub> emissions come from electricity generation, nearly one-third from transportation, and almost one-third from other sources (residential, commercial, and industrial sources of combustion). A small amount of emitted CO<sub>2</sub> comes from fossil fuels that are not burned, mainly as a result of industrial processes. (See Figure 1.)

The other 16% of U.S. greenhouse gas emissions include methane emissions from landfills, mining, and agriculture, and nitrous oxide (N<sub>2</sub>O) emissions predominantly from fossil fuel combustion, fertilizer use in agriculture, and industrial production of nitric acid and adipic acid. Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), released as byproducts of industrial processes and as fugitive emissions from the replacement of ozone-depleting substances, and sulfur hexafluoride (SF<sub>6</sub>), mainly from semiconductor manufacturing, account for a relatively minor percentage of emissions.<sup>2</sup>

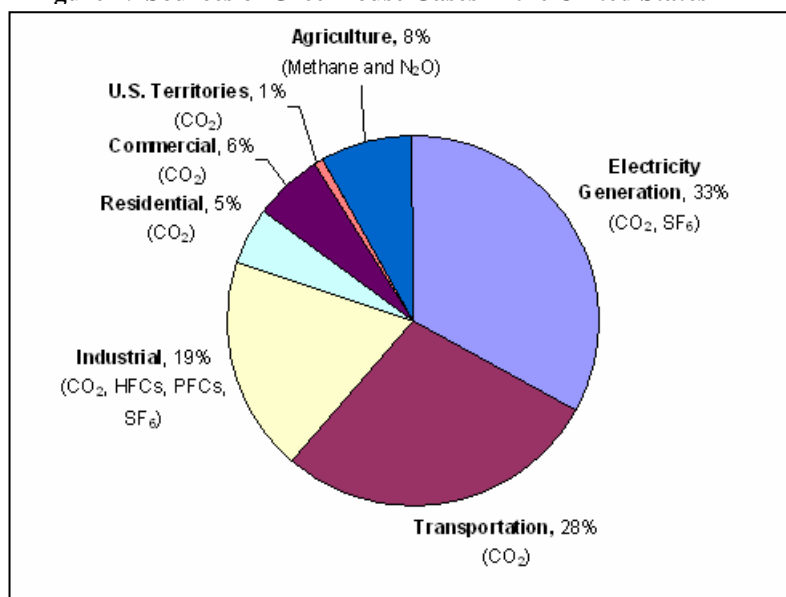
A further breakdown of the electricity and transportation sectors, the two largest contributors to greenhouse gas emissions, provides insight into potential areas for emission reductions.

### Electricity Generation

Carbon dioxide emissions from the electricity sector in the United States are predominantly generated by coal-fired power plants. Coal accounts for over half of electricity generation in terms of kilowatt hours, but 82% of CO<sub>2</sub> emissions from the electricity sector -- the largest piece of the pie in terms of U.S. greenhouse gas emissions. Natural gas, in contrast, generates 13% of the country's electricity and is responsible for 13% of emissions in this sector because it is a less carbon-intensive fuel. Nuclear energy supplies 20% of our electricity, while hydroelectricity and renewable energy sources combined generate 12% and emit very little to no greenhouse gases.<sup>3</sup> Shifting away from coal to low-carbon, renewable sources such as wind and solar would significantly reduce CO<sub>2</sub> emissions from the electricity sector.

Identifying the consumers of electricity in the United States is another way to determine where greenhouse gases come from and where emission reductions can be best achieved. Residential buildings consume the greatest share of electricity, 37%, for heating, cooling, lighting and running appliances in homes. Commercial entities, such as non-manufacturing businesses, consume 35% of

Figure 1. Sources of Greenhouse Gases in the United States



Source: U.S. Environmental Protection Agency, April 15, 2007, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005*, p. ES-14.

electricity, followed by industry, which consumes 28%.<sup>4</sup> Reducing demand from these sectors and implementing energy efficiency measures would also be ways to reduce emissions from the electricity sector.

### Transportation

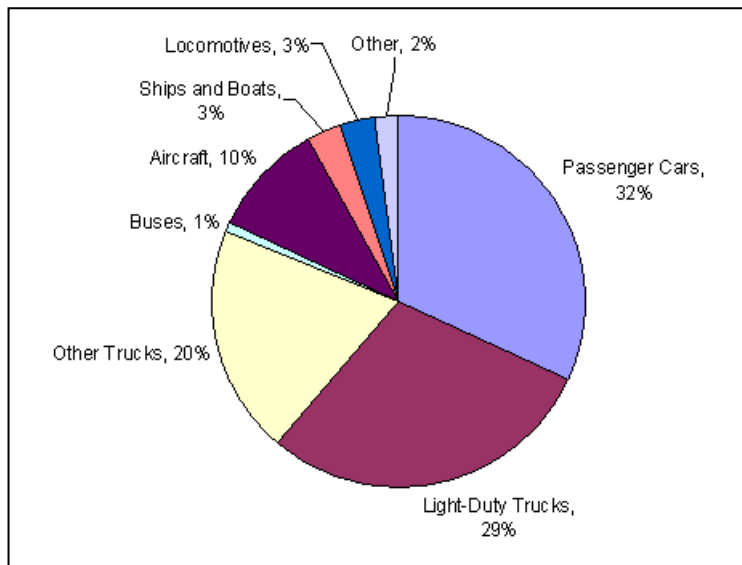
Carbon dioxide emissions from the transportation sector are mainly attributed to passenger cars (32%), light-duty trucks (29%), and medium- and heavy-duty trucks (20%).<sup>5</sup> (See Figure 2.)

In the transportation sector, the vast majority (98%) of emissions come from petroleum use, while nearly 2% are from natural gas use and less than 1% from electric vehicles.<sup>6</sup> More than two-thirds of the petroleum consumed in the United States is used to fuel vehicles.<sup>7</sup> In 2006, 60% of this petroleum was imported in the form of crude oil.<sup>8</sup>

There are a number of ways to reduce emissions from the transportation sector. Improving vehicle fuel efficiency is one policy already under way. In December of 2007,

Congress passed the Energy Independence and Security Act, which included a provision to raise fleet-wide auto fuel efficiency standards for all passenger vehicles to 35 miles per gallon by 2020. This increase in fuel economy will reduce global warming emissions by nearly 200 million metric tons in 2020.<sup>9</sup> Other measures to reduce sector emissions and petroleum consumption include implementing a tailpipe emissions standard and low-carbon fuel standard, as well as enacting policies to help reduce vehicle miles traveled (VMT) through increased use of public transportation and smart city planning.

Figure 2. CO<sub>2</sub> Emissions from Transportation



Source: U.S. Environmental Protection Agency, April 15, 2007, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005*, p. 2-27.

<sup>1</sup> U.S. Environmental Protection Agency (EPA), April 15, 2007, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005*, available at <[www.epa.gov/climatechange/emissions](http://www.epa.gov/climatechange/emissions)>.

<sup>2</sup> *Ibid.*, and “High Global Warming Potential Gases,” U.S. EPA, available at <[www.epa.gov/highgp/projections.html](http://www.epa.gov/highgp/projections.html)>.

<sup>3</sup> Energy Information Administration (EIA), November 28, 2007, *Emissions of Greenhouse Gases in the United States 2006*, available at <[www.eia.doe.gov/oiaf/1605/ggrpt/index.html](http://www.eia.doe.gov/oiaf/1605/ggrpt/index.html)>; and EIA, October 22, 2007, *Electric Power Annual*, available at <[www.eia.doe.gov/cneaf/electricity/epa/epat1p1.html#\\_ftn1](http://www.eia.doe.gov/cneaf/electricity/epa/epat1p1.html#_ftn1)>.

<sup>4</sup> EIA, June 27, 2007, *Annual Energy Review 2006*, available at: <[www.eia.doe.gov/emeu/aer/elect.html](http://www.eia.doe.gov/emeu/aer/elect.html)>.

<sup>5</sup> U.S. EPA, *op. cit.* 1.

<sup>6</sup> EIA, November 28, 2007, *Emissions of Greenhouse Gases Report*, available at <[www.eia.doe.gov/oiaf/1605/ggrpt/carbon.html](http://www.eia.doe.gov/oiaf/1605/ggrpt/carbon.html)>.

<sup>7</sup> EIA, “Basic Petroleum Statistics,” available at <<http://www.eia.doe.gov/basics/quickoil.html>>.

<sup>8</sup> *Ibid.*

<sup>9</sup> Union of Concerned Scientists, December 6, 2007, “Extensive Benefits Attained from Fuel Economy Agreement: Oil Savings, Consumer Benefits, New Jobs, and Environmental Protection.”

CONTACT: SHANNON HEYCK-WILLIAMS, SENIOR GOVERNMENT OPERATIONS ASSOCIATE  
202-887-8801 | [sheyck-williams@pewtrusts.org](mailto:sheyck-williams@pewtrusts.org)

GEOFFREY BROWN, SENIOR GOVERNMENT OPERATIONS OFFICER  
202-887-8806 | [gbrown@pewtrusts.org](mailto:gbrown@pewtrusts.org)